MINISTRY OF FORESTS LIBRARY
PO BOX 9523 STN PROV GOVT
VICTORIA BC V8W 9C2

RESEARCH SUMMARY

December 1996 RS-031

forest sciences
NELSON FOREST REGION

CASE STUDY: Helicopter Logging For Bark Beetle Control

By Angela Hawe, Silvicultural Systems Forester

■ **Heli-logging can be a viable option in visually sensitive areas**

LIBRARY
MINISTRY OF FORESTS
1450 GOVERNMENT ST.
VICTORIA, B.C.
V8W 3E7

634.909711
BCMF
RES
NE
RS
1990-

INTRODUCTION

Helicopter logging is becoming an increasingly popular logging option for forest managers throughout B.C. In the Kootenay Lake Forest District (KLFD), the Small Business Forest Enterprise Program (SBFEP) has had success using helicopters to help tackle some difficult forest management problems, particularly beetle outbreaks in areas with important social values, and beetle outbreaks in hard-to-access areas.

This summary describes two SBFEP helicopter logging operations in the KLFD, both of which were designed to mitigate beetle problems. The first of these contracts covered an area along the West Arm of Kootenay Lake where extensive but low-intensity Douglas-fir beetle outbreaks had been identified. The second contract was near Creston and covered a hard-to-reach area of approximately 100 ha with a significant mountain pine beetle outbreak. Due to the logistics of the two specific operations, one was awarded as a Silviculture Contract and the other as a Timber Sale License.

WEST ARM CONTRACT

Background

In the spring of 1994, Douglas-fir bark beetle outbreaks were noticed along a 15-km stretch of hillside adjacent to the West Arm of Kootenay Lake. These outbreaks were quite patchy, but covered an extensive area, most of which fell within the jurisdiction of the SBFEP.

The area is very scenic and highly visible, therefore forest management options in the vicinity are often restricted. Many of the outbreaks were located in places with no road access. District staff were faced with getting the infested wood out promptly, but in a manner that would result in little or no visual impact.

Ground probes were organized for the infested areas and these showed that beetles were just emerging. The district set up trap trees that could later be removed by helicopter. However, follow-up probes of the area in mid-summer indicated the occurrence of additional infested trees. All trap trees and infested trees were then marked for removal, and their locations were mapped. Because the objective of removal was beetle control, not merely salvage, only trees with beetles still in the trees - both red and green attack -were marked. Grey attack trees were left as wildlife trees as they did not pose a threat for further infestation.

Estimates, based on ground probes of the area, indicated that approximately 4100 m^3 of wood -about 1000 trees, predominantly Douglas-fir with some ponderosa pine-would have to be removed. However, this volume was spread over a very large area, and the logistics of removing it were quite complicated. The District estimated logging costs for the Sale to be \$70-\$80/m^3, i.e., significantly higher than the \$50/m3 stumpage allowance available for helicopter logging. After investigating the options for removing the beetle-infested trees, the District determined that helicopter logging would be the most suitable method because:

- The outbreaks were spread across an extensive area.
- Some sites did not have road access.
- The volume of wood to be removed from each location was small.
- The problem needed to be dealt with promptly.

The job was put out to tender as a Silviculture Contract for pest control purposes (using a

license to cut as a timber mark), rather than as a Timber Sale, which must have a positive stumpage value. Silviculture Contracts also have the advantages of allowing the Forest Service more control and flexibility.

The District sent tender packages to seven helicopter companies in B.C. specifying that bids must include the cost of logging, removing the wood, and the upset stumpage rate of $9.52/m³. Two companies submitted bids; the unsuccessful proponent bid a cost of $152/m³, and the successful proponent bid a bonus bid of $5 over the upset stumpage rate -a difference of over $600,000.

Harvesting Operations

Due to a number of delays, harvesting operation did not get under way until October, and the work was only half completed by the time snow and bad weather forced the operation to shut down in early December. Work started again in January and continued intermittently,weather permitting, until the contract was completed in April 1995. The entire contract took about 40 days to complete, at a rate of three to four loads per day (approx. 100 m³). An additional 15 days were required by ground crews for organizational activities and cleanup.

The contractor used three different helicopters. A Bell 205 was tried first but was found to be too small to handle the large Douglas-fir logs,many of which had to be bucked into short lengths for the helicopter. A Sikorsky S58 was also used, but it was too large and inefficient given the dispersed nature of the stems. A Bell 214 with dual engines was found to be best suited to this particular job, i.e. in terms of tree size, load size, turn-around time, etc.

The contractor encountered several difficulties over the course of the Sale:

- Because the trees were scattered, ground operations were less efficient than the company anticipated. Crew were required at numerous locations (some with no road access), making scheduling very complicated. Five to eight radio-equipped crew people were used and crews had to be sent into an area three or four days in advance to fall enough wood for the helicopter to come in.
- The late start-up date resulted in frequent downtime due to bad weather. The contractor had to pay overhead expenses and crew wages over much of this time.
- The contractor experienced scheduling problems due to previous obligations, and this affected the scheduling and consistency of the operation.

District SBFEP staff encountered some problems as well:

- Inadequately marked trees caused confusion.
- The contract did not require a full-time ground foreman. An MoF technician ended up supervising the contract almost full-time to ensure successful completion. Future contracts will require a full-time ground supervisor.
- Some high stumps occurred because of winter harvesting.

The end result, however, was quite acceptable and the District considers the operation a success. The contract paid for itself, sent 4500 m3 of wood to local mills, and was generally well received by the public.

Follow-Up

The heli-logging beetle- control program appears to be working. Surveys of areas treated in 1994/95 showed a 50% decrease in Douglas-fir beetle populations, whereas populations increased 100% over the same period in untreated areas. However, the heli-logging beetle control program is not a permanent solution to beetle problems along the West Arm. The species and age class structure of these forests predisposes them to beetle attack; the trap tree and infested tree removal program is only a temporary measure, aimed at controlling beetle populations at acceptable levels. This will buy time for District planners, forest health specialists, etc. to develop longer-term treatment options.

CRESTON TIMBER SALE

This Timber Sale was located near Creston in a roadless area, on Bohan Creek Face above the Goat River. In 1994, surveys of the area found pockets of red and green bark beetle attack. With no time to build a road into the area, the District hired an independent contractor to assess the area and determine options for dealing with the problem. The contractor recommended heli-logging.

However, using heli-logging to remove only the infested patches would not have been economically feasible given the small size of the pine and the small volumes requiring removal. Instead, the District decided to develop a number of larger blocks based on the natural boundaries of the lodgepole pine types in the infested area. On areas where fir or larch were present within a type, these species were retained for visual purposes. The diverse character of the natural landscape (slopes varying from 15 to 60%, rocky knolls, etc.) was well suited to this prescription, and the final result was well within visual quality objectives.

A Timber Sale of approximately 18 000 m³ – predominantly small lodgepole pine – was put up for bid to a

number of helicopter companies. The Sale was set for handfalling with the slash to be left on site. Upset stumpage was set at $9/m^3$, and the District received three bonus bids, ranging from $15/m^3$ to $3/m^3$.

The Small Business Forester received several enquiries from helicopter companies about the use of small feller-bunchers on more gently sloped areas of the blocks. The companies proposed dismantling the machines into several moderate-sized pieces and flying the parts up to the site. They felt that the increased productivity possible with mechanical falling would more than compensate for the cost of flying the equipment in and out. Unfortunately this was not possible because the sale was already out for tender and the prescription did not include an allowance for site disturbance (skid trails, etc.).

The contract was awarded to the highest bidder. Operations proceeded well, although problems were encountered on the ground when the helicopter attempted to remove the merchantable stems from amongst the tops and branches that had been bucked on site. The tangle of pieces made it difficult to find and extract the stems. This was solved by modifying the prescription slightly to allow for full-tree yarding. The trees were light enough that the helicopter could still carry a reasonable load (i.e. 8-10 trees) each turn. The contractor used a mechanical debarker/delimber on the landing to process the incoming trees. The contractor estimated 20-30% additional weight was hauled by taking the tops. The cost associated with this was offset by productivity savings from bucking on the landing and the utilization of the tops as fence posts. From a District perspective, the removal of the tops from the blocks was beneficial because a potential slash hazard was avoided.

The end result was a very clean site, and good utilization of the fibre removed.[1] The beetle problem was dealt with promptly, and the helicopter company appeared satisfied with the returns. Follow-up surveys in 1995, indicated that the treatment was a success, with very low levels of mountain pine beetle occurring in the vicinity of the harvested block.

TIMBER SALE, OR SILVICULTURE CONTRACT?

The choice of using a Timber Sale Licence or a Silviculture Contract for removing beetle infested wood by helicopter depends on a number of factors including value of wood, size of patches, turn around time, etc. A Timber Sale License will not be viable if harvest costs are expected to be greater than the appraisal allowance. For beetle sales, the appraisal allowance for helicopter logging is often inadequate because the layout and volumes of a sale are based on attack locations rather than designed for achieving operational efficiencies. In these cases a Silviculture Contract for pest control reasons may be the only available option given the economics and logistics of an operation. Silviculture contracts do not allow for the removal of wood, so a licence to cut is also required for stumpage and hauling.

There are a number of benefits to using a Silviculture Contract:

- Small jobs that would otherwise be uneconomical can be justified as pest control.
- Wood that may otherwise not be salvaged can be utilized.
- Silviculture Contracts can be implemented faster and cancelled more easily than Timber Sales; i.e. if cancellation occurs, a Silviculture Contract can be awarded to the next lowest bidder whereas a Timber Sale licence must be retendered.
- The contractor can determine likely cost, and has the option of bidding at a rate that will provide revenue to the Crown.
- All standard logging clauses (waste and residue, etc.) can be included in the Silviculture Contract to ensure quality control.

SUMMARY

Because helicopter logging is expensive relative to other systems, it is generally used only in areas for which there are no other options,. e.g., areas with no road access, areas that are technically difficult, or areas where site sensitivities require very low impact operations.

Helicopter logging has proven to be a viable harvesting option for a wide variety of problem sites. In the case of beetle outbreaks in hard-to-access areas, it may be the only viable option. In these cases the costs of helicopter logging need to be assessed relative to the costs of manually treating (cut and burn)an area and the long-term costs of not treating an area.

A number of critical factors must be considered before committing to helicopter logging:

- A short distance (1.0-1.5 km) from block to landing is required for economic viability, although this also depends on current markets.
- The economics of helicopter logging will vary depending on current wood prices, the logistics of an operation, and the value of timber on a site. The two Sales described here were undertaken during a period of very high timber prices and this would certainly have influenced the bids.
- Site limitations may preclude the use of helicopters, or substantially reduce productivity. For example, a 45-degree slope provides optimum descent ratio; steeper slopes slow down production.
- Layout is complicated for helicopter Sales especially in gullied terrain, small blocks, etc.
- Post-harvest activities are limited by the difficult access, and this may have implications for regenerating a site.
- Experienced contractors are limited. Many of the better operators are booked for a year in advance and are unable to bid on short time-frame contracts.

There is much opportunity for innovation when developing heli-logging prescriptions. Success depends on good preparation and organization, skilled helicopter and ground crews, and realistic bidding.

[1]This may not meet current coarse woody debris guidelines for biodiversity objectives.

FOR MORE INFORMATION CONTACT:

Julie Castonguay, Forest Health Forester
Kootenay Lake District
250-825-1100
jucaston@mfor01.for.gov.bc.ca

on Case Studies initiative:

Deb De Long, Silv. Systems Research Forester
Nelson Forest Region
250-354-6285 ddelong@mfor01.for.gov.bc.ca